

## ORIGINAL ARTICLE

## Prevalence of chlamydia and gonorrhoea among a population of men who have sex with men

R L Cook, K St George, A J Silvestre, S A Riddler, M Lassak, C R Rinaldo Jr

Sex Transm Infect 2002;78:190–193

See end of article for  
authors' affiliations

Correspondence to:  
Robert L Cook, University  
of Pittsburgh, E820 UPMC  
Montefiore, 200 Lothrop  
Street, Pittsburgh, PA  
15213, USA;  
cookrl@msx.upmc.edu

Accepted for publication  
7 March 2002

**Objectives:** Few data are available on the prevalence of sexually transmitted diseases (STDs) in men who have sex with men (MSM), making it difficult to develop STD screening guidelines for this population. The objective of the study was to determine the prevalence of urethral infections caused by *Chlamydia trachomatis* and *Neisseria gonorrhoeae* within a large, community based population of MSM, and to assess the feasibility of rectal screening in this population.

**Methods:** This was a cross sectional study of 566 MSM, who were predominantly middle aged, white, asymptomatic, and engaged in sex with multiple partners. All provided a urine sample to screen for chlamydial and gonorrhoea infections using a PCR assay; rectal screening was performed on 48 participants.

**Results:** Urethral *C trachomatis* infections were detected in 1/566 participants (prevalence 0.2%, 95% CI 0.004% to 1.0%), and rectal *C trachomatis* infections were detected in 2/48 men (prevalence 4.2%, 95% CI 0.5% to 14.2%). No gonorrhoea infections were detected, and none of the 117 HIV positive men had either infection.

**Conclusions:** Chlamydial and gonorrhoea infections were uncommon in this sample of MSM, even among those with multiple sexual partners or HIV infection. These data call into question recommendations to screen all MSM based on their individual sexual behaviours or HIV. Additional data are needed on the prevalence of these infections in MSM from different settings.

Many men who have sex with men (MSM) continue to practise risky sexual behaviours, despite the ongoing risk of HIV infection.<sup>1,2</sup> These behaviours may lead to sexually transmitted infections resulting from *Chlamydia trachomatis* or *Neisseria gonorrhoeae*, which continue to be common among some populations of MSM.<sup>1–11</sup> If not detected and treated, these infections may result in painful clinical syndromes such as urethritis, epididymitis, or proctitis,<sup>12</sup> and they also appear to increase the risk of HIV transmission.<sup>13–16</sup> Because chlamydial and gonorrhoea infections are often asymptomatic, it has been suggested that routine screening for these infections should be performed among at-risk MSM in order to prevent disease complications and to reduce the risk of HIV transmission.<sup>16,17</sup>

To date, nearly all data on the prevalence of chlamydial and gonorrhoea infections among MSM have come from men attending sexually transmitted disease (STD) clinics, which may not be representative of other MSM in the community. The most recent recommendations from the US Preventive Services Task Force conclude that there is insufficient information available to recommend for or against screening for chlamydial or gonorrhoea infections among MSM.<sup>18</sup> Until better data are available, the US Centers for Disease Control and Prevention recommends annual STD screening for at-risk MSM, defined as those who are young, who have more than one sex partner per year, or who have HIV infection.<sup>17</sup> Data from MSM outside of STD clinics are urgently needed to confirm current recommendations or to suggest alternative strategies. The primary objective of this study was to determine the prevalence of urethral infections due to *C trachomatis* and *N gonorrhoeae* among a large sample of MSM. A secondary objective was to assess the feasibility of rectal screening in this population.

## METHODS

The study used a cross sectional design. The study population was drawn from MSM participating in either of two ongoing,

longitudinal studies of the natural history of AIDS. One group of MSM included the Pittsburgh participants in the Multi-center AIDS Cohort Study (MACS). Approximately 350 Pittsburgh MACS participants are seen twice annually for routine visits including phlebotomy, questionnaires, and a physical examination.<sup>19</sup> A second group of MSM included participants in the Pitt Men's Study, an ongoing HIV screening study involving approximately 2000 MSM, of whom roughly 500 present for a brief visit and HIV serology testing during any 6 month period.<sup>20</sup> Both groups of MSM included those who are HIV positive and who are HIV negative.

All 702 people participating in the MACS or the Pitt Men's Study who presented for their routine assessment between May 1998 and October 1998 were invited to participate in this additional study to screen for genitourinary chlamydial and gonorrhoea infections. People were eligible regardless of the presence of symptoms or sexual risk factors. Some participants were also offered targeted rectal screening if they had experienced any rectal symptoms during the previous 6 months (for example, pain, burning, itching, or discharge), or if they had practised receptive anal intercourse during the previous 6 months. All participants signed an institutional review board approved informed consent document.

## Measurements

Participants completed a written survey that included information on subject demographics (age, race), and their sexual behaviours and STD related symptoms since their previous assessment period (approximately 6 months earlier). Specifically, we asked about condom use, the presence of urethral or rectal symptoms, the number of male and female sexual partners, and the number of male partners with whom the participant had practised oral receptive, oral insertive, anal receptive, and anal insertive intercourse. Categories were created for age ( $\leq 35$ , 36–49,  $\geq 50$  years old); urethral or rectal symptoms (any v none); number of sexual partners (none, 1, 2–4, 5–19, and  $\geq 20$ ); specific sexual behaviours (any v none

for each pattern of intercourse), and condom use during anal intercourse (use with all partners *v* not all partners).

Participants provided a urine specimen that included the first part of the urine stream. Samples were stored in sterile containers at 4°C and transported within 72 hours to the clinical virology laboratory. If rectal screening was accepted, a clinician collected the rectal sample by placing two swabs approximately 1 cm into the rectal canal for 5–10 seconds. One swab was placed in M4 viral transport media, stored at 4°C and transported to the clinical virology laboratory within 72 hours of collection. The other swab was inoculated immediately following collection onto Thayer-Martin agar (Jem Bec plates), placed into an incubator, and transported within 24 hours to the clinical microbiology laboratory for further incubation and assessment.

### Laboratory testing

Urine specimens were assayed for chlamydial and gonorrhoea infections by polymerase chain reaction (PCR) using the Cobas Amplicor CT/NG test assay (Roche Diagnostic Corporation, Indianapolis, IN, USA). Urine based PCR testing for chlamydia has a sensitivity of 74%–97% and specificity of 97%–99.7%; for gonorrhoea the sensitivity is 80%–98% and specificity is 96%–99%.<sup>21–26</sup> Testing was done according to the manufacturer's instructions and equivocal samples were retested in duplicate. The assay's amplification control was run on all specimens to check for inhibition, and one of the 566 showed amplification inhibition. The specimen was diluted 1/10 and on retesting, there was no amplification inhibition.

The Cobas Amplicor CT/NG test assay is currently FDA approved for *C trachomatis* and *N gonorrhoeae* testing from male urine samples, but it was not yet FDA approved at the time of this study. Therefore, the upper limit for the equivocal range used in this study (optical density 0.2–0.8) was slightly lower than the current definition, and all positive results were confirmed using a test method that was FDA approved at the time of the study. Specifically, all urine samples positive for chlamydial infections were retested using the Roche Cobas Amplicor test for *C trachomatis*, and people initially testing positive for gonorrhoea were to return to the survey site for a confirmatory gonorrhoea culture from a urethral swab.

Rectal swab samples were tested for chlamydial and gonorrhoea infections by the Cobas Amplicor CT/NG test assay, following the manufacturer's instructions for use with M-4 culture media. The assay's amplification control was run on all specimens to check for inhibition, and three of 48 (6%) showed amplification inhibition. These were diluted 1/10 and retested; on retesting, there was no amplification inhibition in the diluted samples. All rectal swab samples were also assessed by standard culture techniques for *C trachomatis* and *N gonorrhoeae*, including the use of BGMK cells and immunofluorescent staining for chlamydia cultures. All urine and rectal specimens with discrepant results were retested using ligase chain reaction (LCR) (Abbott Diagnostics, Abbott Park, IL, USA) and considered to be true positives if two of the three test methods reported a positive result.

Data analyses were conducted using intercooled STATA 5.0 software (College Station, TX, USA). Data in categories were evaluated using  $\chi^2$  or Fisher's exact test analyses; comparisons of continuous data were conducted with *t* tests. Confidence intervals for proportions were determined using the binomial distribution.

### RESULTS

Of 702 men who presented for their routine assessment during the study period, 566 agreed to participate in the study. The majority of those who declined to participate told study staff they did not think they were at risk, although a few cited confidentiality concerns. Compared to those who declined to participate, participants were significantly more likely (*p*

**Table 1** Demographic characteristics and sexual behaviour of participants

	Participants (n=566)
	No (%)
Race	
White	528 (95)
Black	17 (3)
Other*	10 (2)
Age (years)	
≤35	127 (22)
36–49	324 (58)
≥50	115 (20)
Asymptomatic	492 (88)
HIV positive	117 (20)
Sexual partners†	
0	56 (10)
1	154 (27)
2–4	139 (25)
5–19	149 (26)
≥20	55 (10)
Any female sex partner‡	20 (3)
Oral insertive intercourse (any)	466 (84)
Oral receptive intercourse (any)	473 (85)
Anal insertive intercourse (any)	287 (51)
Anal receptive intercourse (any)	245 (44)
Condom use with anal intercourse (always)‡	169 (49)

\*7 were Hispanic, 2 Asian, and 1 American Indian.

†Previous 6 months.

‡Of 348 men practising any anal intercourse (insertive or receptive).

<0.05) to be HIV positive (21% *v* 13%), to have more than one sexual partner during the previous 6 months (63% *v* 42%), and to have had any genitourinary or rectal symptoms during the previous 6 months (13% *v* 4%). The 566 study participants were predominately middle aged (mean 43 years, range 20–87), white (95%), asymptomatic (88%), and engaged in sex with multiple partners (63% had at least two partners and 36% had at least five partners during the previous 6 months) (table 1). Nearly all (97%) engaged in sex exclusively with men, and one fifth (21%) were HIV positive.

Using urine specimens, urethral *C trachomatis* infections were detected in one of 566 participants (prevalence 0.2%, 95% CI 0.004% to 1.0%). None of the 566 people had a current urethral infection due to *N gonorrhoeae* (prevalence 0.0%, 95% CI 0.0% to 0.6%); all 566 samples were negative by Cobas Amplicor test for *N gonorrhoeae*. The one person positive for chlamydial infection was an asymptomatic 42 year old man who reported two sexual partners during the previous 6 months and who did not use condoms every time he had intercourse.

Of 268 men with rectal symptoms during the previous 6 months or who had engaged in receptive anal intercourse, 48 (18%) accepted a rectal screening test. Of these 48, rectal infections due to *C trachomatis* were detected by both PCR and culture in two men (prevalence 4.2%, 95% CI 0.5% to 14.2%). None of the men had a confirmed rectal infection due to *N gonorrhoeae* (prevalence 0.0%, 95% CI 0.0% to 7.3%). The two rectal chlamydial infections occurred in men aged 30 and 54 years, who were both asymptomatic and who both had anal receptive intercourse with at least 10 different partners in the previous 6 months. One of the 48 participants who received rectal screening had a positive result for *N gonorrhoeae* by PCR, but a negative gonorrhoea culture. The same results were obtained after retesting. The LCR result was negative; therefore, this test result was considered to be a false positive.

None of the 117 men with HIV infection had an undetected chlamydial or gonococcal infection. A similar percentage of men with HIV infection engaged in anal intercourse as those without HIV infection (58% *v* 64%, *p*=0.20); however, men

with HIV infection were significantly more likely to always use condoms during anal intercourse (62% v 46%,  $p=0.019$ ).

## DISCUSSION

Genitourinary and rectal infections due to *C trachomatis* and *N gonorrhoeae* were uncommon in this sample of MSM, even among those who were young, those with high risk sexual behaviours, and those with HIV infection. These data add to the limited amount of existing data on the prevalence of these infections among MSM outside of an STD clinic setting. Thus, the data may be useful in helping to develop screening recommendations for chlamydial and gonorrhoea infections among MSM.

Identifying chlamydial and gonorrhoea infections in MSM is important because of mounting evidence linking chlamydial and gonorrhoea infections with an increased risk of HIV transmission.<sup>14, 15</sup> Among a sample of African men with HIV infection, genitourinary gonococcal infections were associated with a 10-fold increase in the HIV viral load in semen,<sup>27</sup> and a community based randomised controlled trial found that aggressive treatment of symptomatic STDs decreased the incidence of new HIV infections by 44% over a 2 year period.<sup>28</sup> Therefore, some authorities have recommended routine STD screening for all men with HIV,<sup>17</sup> and others recommend STD screening as an important strategy to prevent HIV transmission.<sup>16</sup>

Nearly all previous data on the prevalence of chlamydial and gonococcal infections among MSM has come from STD clinics, where most of the men presented with symptoms. In these settings, the prevalence of chlamydia infections has ranged between 2% and 12%,<sup>3-11</sup> and the prevalence of gonorrhoea infections has ranged from 6% to 25%.<sup>4, 6, 8, 9, 11</sup> Asymptomatic urethral infections were also relatively common among a general population of men in the county jail (6%) and high school clinics (4%) within the same community as our sample.<sup>29, 30</sup>

We had hypothesised that the prevalence of chlamydial and gonococcal infections would be higher, since two thirds of the sample had multiple sexual partners and both infections have been relatively common among men in other settings. The prevalence may have been low in our study because most of the subjects were middle aged and white, whereas chlamydial and gonorrhoea infections have previously been associated with younger age and black race.<sup>4, 6, 9</sup> Furthermore, participation in rectal screening was optional and many participants did not accept the rectal test. We did not specifically inquire about the reasons that participants declined rectal screening, although study staff stated that many participants appeared reluctant to undress or to have a clinician obtain the rectal sample. Additional information on factors that influence the acceptability of rectal screening for STDs is clearly needed, and one must use caution before generalising the study findings to all MSM.

Interestingly, none of the 117 men with HIV infection in our sample had an undetected chlamydial or gonococcal infection. The few data on asymptomatic STDs among HIV positive men suggest that the prevalence is relatively low in outpatient settings.<sup>31, 32</sup> However, the cumulative prevalence over time has been 5%–11% in some HIV positive samples, with many infections being asymptomatic.<sup>32, 33</sup> The prevalence among HIV positive participants could have been lower because they were more likely to use condoms consistently, although over one third of HIV positive participants did not always use condoms during anal intercourse. Alternatively, some participants with HIV infection might have been taking prophylactic antibiotics that could reduce their risk of chlamydial or gonorrhoea infections, but we did not have access to data on recent antibiotic use among our sample.

Screening for any condition when the prevalence is very low can lower the positive predictive value of the test, resulting in

## Key messages

- Little is known about the prevalence of bacterial STDs among men who have sex with men (MSM) outside of STD clinic settings
- The data from this paper represent some of the first on STD prevalence among MSM outside of STD or HIV clinic settings
- The prevalence of genitourinary and rectal chlamydial and gonococcal infections was low in this population of MSM, including those with HIV infection
- These data can contribute to the development of screening guidelines for MSM

an increased number of false positive test results. In this study, none of the 566 men screened for genitourinary chlamydial or gonorrhoea infections appeared to have a false positive result with the Amplicor Cobas PCR assay; however, there was one apparent false positive test from a rectal swab, perhaps due to contamination by faecal material or other *Neisseria* species. PCR has been used for rectal screening in other research studies, but it has not been extensively studied and its test characteristics have not yet been well established.

In summary, infections due to *C trachomatis* and *N gonorrhoeae* were uncommon in this sample of MSM. The data raise the question of whether screening all MSM for urethral or rectal chlamydial and gonorrhoea infections will be cost effective, even among those with multiple sex partners or HIV infection. However, this was only one sample and other populations of MSM may be at higher risk. Additional data are needed on the prevalence of asymptomatic STDs among MSM in different geographic regions, specific settings associated with high risk sexual activity such as bars or social clubs, younger men, ethnic/racial minority men, and men in HIV clinic settings.

## ACKNOWLEDGEMENTS

The authors wish to thank William Buchanan, Laurie Johnson, and Steven R Wolfe for their help with data collection, Lawrence Kingsley and Carol Perfetti for early advice and assistance with data management, the staff of the Clinical Virology Laboratory at UPMC for performance of the PCR assays and chlamydia cultures, and the staff of the Bacteriology Laboratory in the Division of Clinical Microbiology at UPMC for assessing the gonorrhoea cultures.

Funding support: Roche Diagnostic Corporation and NIH cooperative agreement U01A135041.

## CONTRIBUTORS

RC, KSG, AS, SR, CR conceptualised and designed the study; KSG and ML performed and interpreted STD essays; RC analysed the data and wrote the primary manuscript; all were involved in interpretation of results and drafting of the paper.

## REFERENCES

- 1 Centers for Disease Control and Prevention. Resurgent bacterial sexually transmitted disease among men who have sex with men—King County, Washington, 1997–1999. *MMWR* 1999;**48**:773.
- 2 Centers for Disease Control and Prevention. Increases in unsafe sex and rectal gonorrhea among men who have sex with men—San Francisco, California, 1994–1997. *MMWR* 1999;**48**:45–50.
- 3 McMillan A, Sommerville RG, McKie PMK. Chlamydial infection in homosexual men. *Br J Vener Dis* 1981;**57**:47–9.
- 4 Stamm WE, Koutsky LA, Beneditti JK, et al. Chlamydia trachomatis urethral infections in men. *Ann Intern Med* 1984;**100**:47–51.
- 5 Munday PE, Carder JM, Taylor-Robinson D. Chlamydial proctitis? *Genitourin Med* 1985; **61**:376–8.
- 6 Rompalo AM, Price CB, Roberts PL, et al. Potential value of rectal-screening cultures for Chlamydia trachomatis in homosexual men. *J Infect Dis* 1986;**153**:888–92.
- 7 Sulaiman MZC, Foster J, Pugh SF. Prevalence of Chlamydia trachomatis infection in homosexual men. *Genitourin Med* 1987;**63**:179–81.
- 8 Rodriguez-Pichardo A, Aznar J, Camacho F, et al. Sexually transmitted diseases in homosexual males in Seville, Spain. *Genitourin Med* 1991;**67**:335–8.



- 9 **Lafferty WE**, Hughes JP, Handsfield HH. Sexually transmitted diseases in men who have sex with men. Acquisition of gonorrhea and nongonococcal urethritis by fellatio and implications for STD/HIV prevention. *Sex Transm Dis* 1997;**24**:272–8.
- 10 **Ostergaard L**, Agner T, Krarup E, *et al.* PCR for detection of Chlamydia trachomatis in endocervical, urethral, rectal, and pharyngeal swab samples obtained from patients attending a STD clinic. *Genitourin Med* 1997;**73**:493–7.
- 11 **Ciemins EL**, Flood J, Kent CK, *et al.* Reexamining the prevalence of Chlamydia trachomatis infection among gay men with urethritis: implications for STD policy and HIV prevention activities. *Sex Transm Dis* 2000;**27**:249–51.
- 12 **American Medical Association**. Health care needs of gay men and lesbians in the United States. Council on Scientific Affairs, American Medical Association. *JAMA* 1996;**275**:1354–9.
- 13 **Cohen MS**. Sexually transmitted diseases enhance HIV transmission: no longer a hypothesis. *Lancet* 1998;**351**(Suppl 3):5–7.
- 14 **Fleming DT**, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. *Sex Transm Infect* 1999;**75**:3–17.
- 15 **Craib K**, Meddings D, Strathdee S, *et al.* Rectal gonorrhoea as an independent risk factor for HIV infection in a cohort of homosexual men. *Genitourin Med* 1995;**71**:150–4.
- 16 **Eng T**, Butler W. *The hidden epidemic: confronting sexually transmitted diseases*. Washington, DC: National Academy Press, 1997.
- 17 **Centers for Disease Control and Prevention**. HIV prevention through early detection and treatment of other sexually transmitted diseases—United States: recommendations of the advisory committee for HIV and STD. *MMWR* 1998;**47**:1–24.
- 18 **US Preventive Services Task Force**. Screening for chlamydial infection: recommendations and rationale. *Am J Prev Med* 2001;**20**(3S):90–4.
- 19 **Kaslow RA**, Ostrow DG, Detels R, *et al.* The Multicenter AIDS Cohort Study: rationale, organization, and selected characteristics of the participants. *Am J Epidemiol* 1987;**126**:310–8.
- 20 **Silvestre A**, Lyter DW, Rinaldo CR Jr, *et al.* Marketing strategies for recruiting gay men into AIDS research and education projects. *J Commun Health* 1986;**11**:222–32.
- 21 **Vincelette J**, Schirm J, Bogard M, *et al.* Multicenter evaluation of the fully automated Cobas Amplicor PCR test for detection of Chlamydia trachomatis in urogenital specimens. *J Clin Micro* 1999;**37**:74–80.
- 22 **Van Der Pol B**, Quinn T, Gaydos C, *et al.* Multicenter evaluation of the Amplicor and automated Cobas Amplicor CT/NG tests for detection of Chlamydia trachomatis. *J Clin Micro* 2000;**38**:1105–12.
- 23 **Bauwens JE**, Clark AM, Loeffelholz MJ, *et al.* Diagnosis of Chlamydia trachomatis urethritis in men by polymerase chain reaction assay of first-catch urine. *J Clin Micro* 1993;**31**:3013–6.
- 24 **Quinn TC**, Welsh L, Lentz A, *et al.* Diagnosis by Amplicor PCR of Chlamydia trachomatis infection in urine samples from women and men attending sexually transmitted disease clinics. *J Clin Micro* 1996;**34**:1401–6.
- 25 **Wiesenfeld H**, Uhrin M, Dixon BW, *et al.* Diagnosis of male Chlamydia trachomatis urethritis by polymerase chain reaction. *Sex Transm Dis* 1994;**21**:268–71.
- 26 **Martin DH**, Cammarata C, Van der Pol B, *et al.* Multicenter evaluation of Amplicor and automated Cobas Amplicor CT/NG tests for Neisseria gonorrhoeae. *J Clin Micro* 2000;**38**:3544–9.
- 27 **Cohen MS**, Hoffman IF, Royce RA, *et al.* Reduction of concentration of HIV-1 in semen after treatment of urethritis: implications for prevention of sexual transmission of HIV-1. *Lancet* 1997;**349**:1868–73.
- 28 **Grosskurth H**, Mosha F, Todd J, *et al.* Impact of improved treatment of sexually transmitted diseases on HIV infection in rural Tanzania: randomised controlled trial. *Lancet* 1995;**346**:530–6.
- 29 **DeArmitt N**, Wiesenfeld H, Dixon B, *et al.* Male chlamydia urine-screening project. In: Program and Abstracts of the 1998 National STD Prevention Conference (Dallas, TX). Atlanta, GA: Centers for Disease Control and Prevention, 1998.
- 30 **Wiesenfeld H**, Bittner H, Kellinger K, *et al.* Noninvasive testing for Chlamydia trachomatis in high school students: an effective approach to improving compliance with testing in this high-risk population. In: Program and Abstracts of the 1996 National STD Prevention Conference (Tampa, FL). Atlanta, GA: Centers for Disease Control and Prevention, 1996.
- 31 **Flores-Posadas MF**, Morrison CJ, Woodward WC. Is urine ligase chain testing a cost-effective method of STD screening in an HIV population? (abstract no D-32). In: Program and abstracts of the 38th Interscience Conference on Antimicrobial Agents and Chemotherapy; Washington, DC: American Society for Microbiology, 1998:136.
- 32 **Erbolding EJ**, Stanton D, Quinn TV, *et al.* Behavioral and biologic evidence of persistent high-risk behavior in an HIV primary care population. *AIDS* 2000;**14**:297–301.
- 33 **Harris A**, Gibson LP, McLaughlin J. Routine STD screening of HIV-positive adults in primary care settings (abstract no Tu B.2145). In: Program and abstracts for the XI International Conference on AIDS, 7–12 July 1996. Vancouver, BC, 1996:289.

### Clinical Evidence—Call for contributors

*Clinical Evidence* is a regularly updated evidence based journal available world wide both as a paper version and on the internet. *Clinical Evidence* urgently needs to recruit a number of new contributors. Contributors are health care professionals or epidemiologists with experience in evidence based medicine and the ability to write in a concise and structured way.

**We are presently interested in finding contributors with an interest in the following clinical areas:**

**Acute bronchitis  
Acute sinusitis  
Cataract  
Genital warts**

**Hepatitis B  
Hepatitis C  
HIV**

#### Being a contributor involves:

- Appraising the results of literature searches (performed by our Information Specialists) to identify high quality evidence for inclusion in the journal.
- Writing to a highly structured template (about 1500–3000 words), using evidence from selected studies, within 6–8 weeks of receiving the literature search results.
- Working with *Clinical Evidence* Editors to ensure that the text meets rigorous epidemiological and style standards.
- Updating the text every eight months to incorporate new evidence.
- Expanding the topic to include new questions once every 12–18 months.

If you would like to become a contributor for *Clinical Evidence* or require more information about what this involves please send your contact details and a copy of your CV, clearly stating the clinical area you are interested in, to Polly Brown (pbrown@bmjgroup.com).